3. Mixed affections:
    (*a*) Hyperfunction of the pars anterior with hypofunction of of pars posterior—acromegaly with hypophysial obesity.
    (*b*) Hypofunction of both lobes—dwarfism with hypophysial obesity.
4. Hypophysial disturbance, in conjunction with perverted activity of other glands.
    (*A*) Ovarian or testicular hypofunction with:
        I. Hyperfunction of pars anterior—acromegaly with sexual impotence—eunuchoid giants.
        II. Hypofunction of the pars anterior—pituitary dwarfism with sexual impotency.
        III. Hypofunction of pars posterior—dystrophia adiposogenitalis—genital obesity.
    (*B*) Associated with disturbances in the functions of other ductless glands, *i. e.*, adrenals, pancreas, thyroid, pineal gland, thymus (status thymolymphaticus), etc.

MENTAL MANIFESTATIONS IN TUMORS OF THE BRAIN.

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A review of the literature concerning mental disturbances in cases of tumor of the brain shows that it is impossible in the light of present knowledge to determine with any degree of accuracy in what particular tumor a certain group of mental manifestations will occur, neither is it possible to draw definite inferences from the seat of the tumor. The literature on this subject is abundant. Classifications have been attempted and tables drawn up to show the frequency of mental disturbances in tumors of various localities of the cerebrum, but a close analysis reveals contradictory statements from equally competent authors.

Some writers believe that in the majority of cases of tumors of the brain disturbances of intellect are observed. They vary from simple intellectual sluggishness to global dementia. The following manifestations are most frequently observed. A stuporous state predominates in the majority of cases. Whether it is exclusively under the influence of the severe pain in the head or it is independent of the latter it is not always easy to interpret. A state of somnolence is quite usual. Indifference and apathy are common. The patient shows lack or loss of interest in surroundings. An intellectual effort and initiative are frequently in abeyance. In fact, Dupré and Devaux[1] observed in some cases a certain childish mental attitude (puérilisme psychique). The patients are infantile in their replies, in the intonation of their voices, in the mimicry; they show impatience and obstinacy characteristic of children in their motives and desires. In contrast with apathy and indolence, not infrequently we meet with undue irritability, emotionality, abulia, outbrust of passion and anger. The mnemonic faculties are frequently affected and not rarely from the beginning. The patient cannot recall names and events, and may give the impression of commencing paretic dementia.

The mental disturbances just enumerated do not, as a rule, constitute an embarrassing element in diagnosis of brain tumors, as the other characteristic manifestations of the latter do not fail to make their appearance, such as severe headache, vomiting, vertigo, etc. The difficulty lies in discriminating those cases in which the mental symptoms alone are present for a long time before the physical phenomena develop. Oppenheim and Wallenberg[2] reported such cases. The diagnosis is also difficult in cases in which the characteristic symptoms of the classical psychoses are present or are predominating in the clinical picture. Melancholia, mania, dementia precox, acute hallucinatory delirium, paretic dementia, all have been diagnosed and postmortem revealed the presence of tumor in the cerebrum.

If we turn our attention to the localization of the tumor and attempt to draw inferences as to a certain relationship between these two factors, we again meet with failure. The presence of a tumor in any region of the brain cannot explain the accompanying psychic disturbances, and the latter cannot therefore be considered pathognomonic of the first. Otherwise speaking a diagnosis of tumor cannot be based on the presence of certain special mental manifestations. Some writers attempted to build clinical pictures special to the frontal lobes, to the corpus callosum, to the temporal lobes, and to other portions of the brain. Thus change of character, such as suspiciousness, hostility, violence, has been attributed to tumors of the frontal lobe. Jastrowitch describes under the name of "moria" and Oppenheim under the name of "Witzelsucht" a jovial and humoristic state of mind as characteristic of tumors of the frontal lobe. In diseases of the same region other writers observed various mental phenomena, such as enfeeblement of intellect, depression or childishness (Dupré). Symptoms of paretic dementia have also been observed in tumors of the frontal lobe.

On the other hand, similar identical psychic disorders have been seen also in tumors of the psychomotor zone and even in central tumors. Delusions, hallucinations of all varieties, confusional or delirious states characteristic of genuine psychosis, may all accompany tumors of the brain. Complete clinical pictures corresponding to the well-established forms of insanity have also been observed in the course of cerebral neoplasms. In one of my unpublished cases a man, aged thirty-five years, presented for months the alternating phases of manic-depressive psychosis. The maniacal periods were particularly long and pronounced. There was not a single somatic symptom indicative of intracranial pressure for a long time, and only three months before he died, papilloedema developed. Patient was operated on and a large tumor was found in the temporosphenoidal lobe of the left hemisphere. In one of my cases which I am about to report the clinical picture for many months was that of paretic dementia, and only shortly before death excruciating headache and vomiting made their appearance. The disease progressed rapidly. At autopsy a tumor was found in the basal ganglia of the left hemisphere.

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[1] Nouvelle Iconographie de la Salpêtrière, 1901.

[2] Specielle Pathologie und Therapie von Nothnagel, Band ix, Th. 1, Abth. 3.

Among extensive statistical studies of mental symptoms in cerebral tumors those of Shuster and Knapp deserve special mention. The first author in his *Psychische Störungen bei Hirntumoren* reports 775 cases. In 423 cases chiefly mental weakness and dementia were present. In the remaining 352 cases he observed gross mental disturbances suggestive of distinct classical psychoses. The most conspicuous among the latter presented maniacal states (95); the next in proportion were the depressive states (57); then the deliria with hallucinations (52); general paralysis 29 cases and paranoia 19 cases.

In Knapp's tables,[3] drawn from a smaller number of cases, we also find clinical pictures of paresis, of delirious, confused, and maniacal states, also of paranoia. Hallucinations are also mentioned. Shuster is apparently inclined to believe in a certain relationship between the type of mental disorder and the seat of the neoplasm, but a close analysis of his records as well as those of other competent observers does not justify any pathognomonic conclusions; neither can any definite relationship be established between the mental disturbances and the nature of the growth.

The pathogenesis of mental manifestations in the course of brain tumors is debatable. The tolerance of the brain for foreign bodies and growths is well known. There are many cases on record showing the presence of voluminous tumors in various areas of the brain without mental disturbances. Multiple tumors have been observed in the same brain without any mental disorder during life. Softening of vast areas in the brain have been observed also without morbid mental symptoms. These facts tend to prove that destruction of one limited area of the brain substance is not sufficient to produce psychic disturbances, that the intellectual faculties are dependent upon simultaneous coöperation of all constituent portions of the brain. However, mental disturbances have been observed in tumors affecting but limited parts of the brain. Explanations have been sought in various hypotheses. Generalized compression, generalized irritative action caused by localized tumor, auto-intoxication, are the views advanced by various authors for the existence of the mental symptoms. The doctrine of auto-intoxication finds its *raison d'être* in the assumption of continuous absorption of toxic elements originating in the tumor by the venous and lymphatic circulation. The analogy between the clinical picture of uremic encephalopathy and that of cerebral neoplasm is striking. The delirious, hallucinatory symptoms can be readily explained by the toxic pathogenesis. Klippel[4] believes that we have to deal here not only with an auto-intoxication but also with a secondary infectious process. The latter develops around the tumor and gives place to an inflammation. Not infrequently we find at autopsy an acute inflammation in the close vicinity of the tumor, in the meninges, in the ventricles. Thus headache, convulsions, delirium, fever, coma find their explanation.

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[3] Brain, 1906, vol. xxix.

Intracranial pressure, generalized irritation, auto-intoxication, and secondary infection may all render considerable assistance in attempts to explain the presence of a great many mental manifestations accompanying cerebral tumors. When, however, we wish to interpret the development of genuine psychoses in the course of brain tumors, the above views fail to give an adequate explanation.

One of the cases here reported presents the most striking resemblance with paretic dementia both from the stand-points of physical and mental manifestations; yet no meningo-encephalitis was found, and a tumor was seen in an area not at all suspected during life. Neither of the above views explains the clinical picture which for a long time remained almost typical of the great psychosis. Only during the last three months signs of intracranial pressure made their appearance. A negative Wassermann reaction both of the blood and cerebrospinal fluid was also one of the most unexpected occurrences, and rendered considerable assistance in making a diagnosis. The second case is one of a tumor of the pituitary body. During life the mental phenomena were of such a nature that the diagnosis of paresis was repeatedly made by competent men. The third case is one of a tumor situated between the frontal lobe and insula in the left hemisphere. During life the patient presented a very marked dulness, apathy, indolence, and extreme somnolence.

Case I.—C. A. O., aged fifty-six years, contractor of iron works by occupation, drank beer heavily until the last four years of his life. His family history is unimportant. While travelling in foreign lands twenty years ago he contracted yellow fever and erysipelas, from which he completely recovered. He denied venereal diseases.

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[4] Traité de Médecine de Brouardel and Gilbert, article Tumeurs cérébrales.

Four years ago he developed epileptic seizures. They occurred at first occasionally, but they became quite frequent within the last year. Every week or two weeks he would have an attack, and exceptionally two in the same day. The patient's wife's statements as to the seat of the convulsions were not always the same. Sometimes she thought they were confined to the right side and at another time she would say that she observed them on the left side. Ten months before he died he developed hemiplegia on the right side. The paralysis was at first very slight, but it gradually progressed. Since the onset of the paralysis the wife noticed a gradually oncoming change in the patient's mentality. He became at first listless, inattentive, then he began to be careless about his habits. He would spit on the floor, would not change his underwear for two weeks at a time, would soil his clothes when in the toilet (prior to his present illness he was exceedingly particular about cleanliness and neatness). When reproached he would laugh and agree that he was wrong, but would soon forget it. His memory began to fail about a year ago. Mistakes were noticed in writing letters: he would omit letters and sentences. He began to forget names. He could not recollect voluntarily facts of importance, such as business transactions and money matters. On one occasion he received several checks, and a half-hour later they could not be found. They were recovered the next day in the vestibule of his house on the floor near the hall stand. Shortly afterward the wife noticed a difficulty of expressing himself: his speech became thick and certain letters could not be pronounced clearly.

When he presented himself for examination three months before he died I observed the following conditions: He was distinctly hemiplegic on the right side. His paralysis, however, was not pronounced. The leg was only slightly dragged when he walked. There was no marked rigidity in the arm and leg; nevertheless, the power of both was considerably diminished. The right knee-jerk was increased; there was no ankle-clonus; Babinski and paradoxical reflexes were present on the right. The biceps and triceps reflexes of the right arm were increased when compared with the left side. There was a slight deviation of the face to the right. The pupils were unequal: right larger than left; their contours were irregular. The right pupil reacted somewhat sluggishly to light; both reacted well to accommodation. A slight ptosis was observed on the right side. The right eyeball was somewhat protruded. An ophthalmoscopic examination showed a dilatation of the blood-vessels in both retinæ, but no profound changes in the papillæ. The state of the patient's mentality did not permit to determine whether there was diplopia or not. Ocular palsies were not present, with the exception of a slight weakness of the left external rectus. The hands and tongue were affected with a fine tremor. There was some ataxia of the upper extremities. The stereognostic sense was preserved in the right hand, but he was unable to name all the objects placed in it. Asymbolia was therefore present for some objects. The general sensibility, objective and subjective, was affected on the right side. Touch, pain, and temperature were markedly diminished on the entire right side, face included. Besides, the patient frequently complained of severe pain in his right arm and leg. Considering the slightness of the motor paralysis, the case so far presented a thalamic symptom-group.

The sphincters were both involved. Involuntary micturition occurred quite frequently. Constipation was obstinate.

The patient's mentality suggested strongly paresis. His facies was drawn; his answers were slow and delayed; the speech was typically paretic, slow with special stoppage on letters *r* and *m*. He looked weak and exhausted, and at the same time he would say, "I feel fine; nothing ails me." He was unable to realize the paradoxical relation between his condition and answers. At times he would clear up and appear brighter, but this improvement would not last long. His memory was decidedly deficient. He was unable to recollect events of two or three days past. He would frequently call his wife by a different name. He could not tell what he ate two or three hours before. Dulness was very conspicuous. When interrogated, he would stare for a while before he would reply, and then the answers were sometimes without any relation to the questions asked.

The condition as just described, including the physical as well as the mental symptoms, suggested strongly the diagnosis of paretic dementia. Soon, however, the clinical picture commenced to change.

He began to complain of severe headache. Formerly he had headache only at the time of an epileptic seizure, but presently it occurred quite frequently and irrespective of attacks. The patient began to have vomiting spells. In the last month they occurred daily and independently of food. His mentality became more and more deeply affected. He had to be fed, he ceased to recognize distinctly his surroundings. The headache became intense, so that he could not sleep; he groaned continuously. The epileptic attacks became very frequent. The hemiplegia became deeper. The vomiting became almost continuous. Finally coma set in and the patient expired after several violent convulsive attacks rapidly succeeding each other.

While under my observation during the last three months of his life the patient was kept in bed with the exception of occasional brief intervals. Thus opportunity was given to study him from every stand-point. Except the liver, which was enlarged, the other internal organs were found intact. The urine at first contained albumin, which later disappeared entirely. The blood examination as to its physical properties was normal. In view of the clinical evidences of paretic dementia a Wassermann test was made before any treatment was instituted, on the blood-serum and cerebrospinal fluid. To my great surprise the result was negative. A month later the test was repeated, and again the reaction was negative. The cytological examination of the cerebrospinal fluid showed the presence of a number of lymphocytes and a few polynuclear cells. Each lumbar puncture showed a marked increase of pressure in the subarachnoid cavity, as the cerebrospinal fluid emerged with great force.

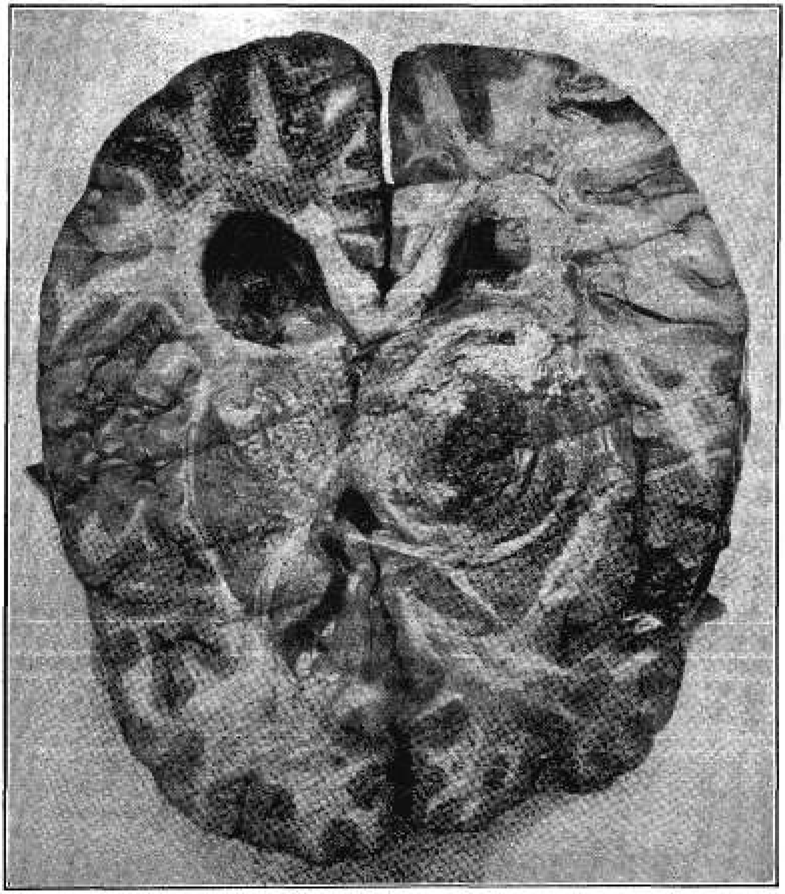

FIG. 1.—Mixed-cell sarcoma in the basal ganglia of left hemisphere.

The negative Wassermann reaction, in spite of the distinct clinical symptoms of paresis, made me reject the latter diagnosis. Subsequent events mentioned above proved the case to be one of cerebral neoplasm simulating paredic dementia.

Autopsy performed twenty-four hours after death revealed the following: The heart, lungs, and kidneys were apparently normal. The liver was enlarged and hard. The scalp and skull were of normal thickness, and presented no abnormalities. The dura was pale and the vessels were bloodless. A noticeable feature of the dura was its thickness and resistance to cutting. On the left side, in front of the anterior end of the longitudinal fissure, the brain protruded in spots through the dura. This area, of the size of about a square inch, resembled a leaf which was moth-eaten; the dura covering this area was extremely thin.

The brain was remarkably dry, and there was little fluid after its removal. A tumor was found at the base of the left hemisphere of about the size of an almond. It resembled a convolution which had been pushed out from above downward and from behind to the left of the pons (Fig. 1).

The cord was apparently normal. A transverse anteroposterior section of the brain revealed a large tumor within the basal ganglia of the left hemisphere, destroying the largest part of the caudate and lenticular nuclei, also the adjacent part of the optic thalamus, pushing backward, forward, and externally the neighboring tissues. The tumor extended downward to the base, where it appeared on the side of the pons covered by the cortical substance. Histologically the tumor presented a mixed-celled sarcoma. Below the tumor the tracts were in a state of degeneration.

Case II.—H. S., aged thirty-one years, a watchmaker, was apparently well until the age of twenty-three. At that time the following symptoms developed gradually: ptosis of the left upper eyelid; diplopia; diminution of visual acuity of the left eye; vertigo; headache. The mental phenomena consisted of frequent attacks of loss of consciousness followed by a confusional state lasting two to three weeks at the time. The patient also showed a fine intention tremor of the hands and of the tongue. This condition lasted five years, during which the diagnosis of paretic dementia was made by several competent men.

At that time he began to develop the following symptoms: Bitemporal hemianopsia, optic atrophy in the left eye and optic neuritis in the right eye. Further examination revealed strikingly infantile genitalia and lack of sexual desire. Soon a descending right hemiplegia made its appearance. The patient began to increase in weight; he became markedly adipose, so that six months before he died he weighed 235 pounds. He became enormous. The attacks of unconsciousness continued, and they were followed by prolonged confusional states as before. The adiposity, the bitemporal hemianopsia, with increasing blindness, the infantile genitalia—all finally suggested an angiosarcoma of the pituitary body which was verified by autopsy (Fig. 2). For a long time the case presented the picture of paresis until the characteristic eye symptoms and the adiposity began to make their appearance.[5]

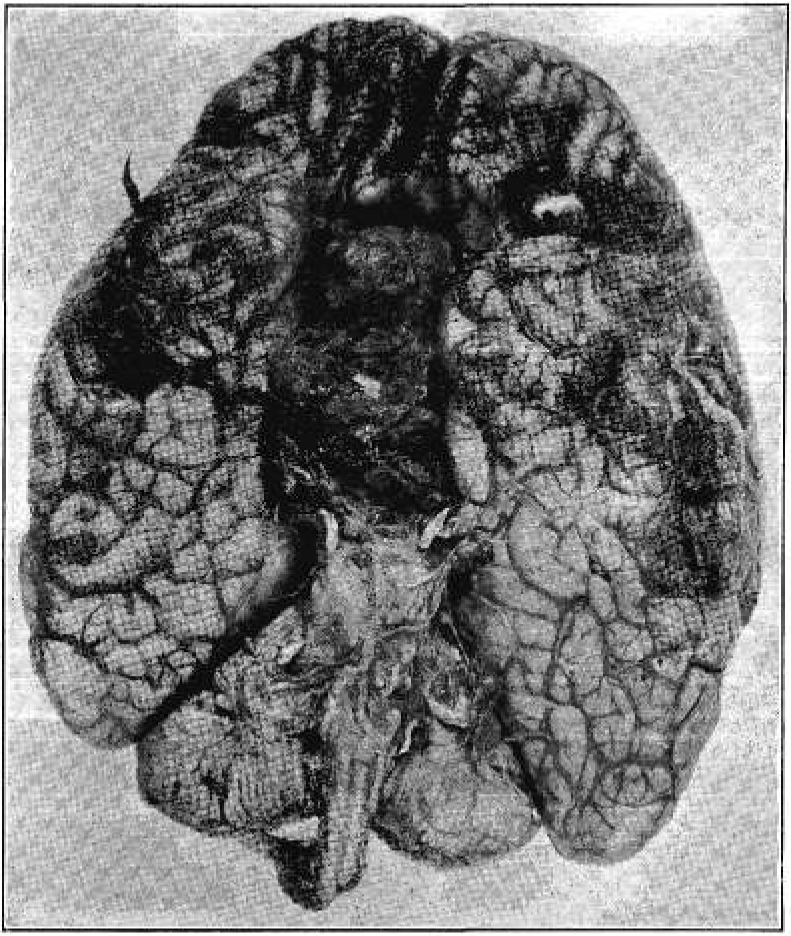

FIG. 2.—Tumor of pituitary body (angiosarcoma).

CASE III.—An Italian boy, aged sixteen years, presented for a long time headache, gradual loss of sight, ataxic gait, loss of knee-jerks, and Achilles tendon reflexes on both sides, with Babinski on one side and paradoxical sign on both sides. The eyes soon showed a high degree of papillitis. The patient's speech was slow. Mentally he presented a marked dulness, apathy, and indifference to surroundings. An operation failed to relieve him (Fig. 3). At autopsy a large round-celled sarcoma was found wedged in between the frontal lobe and the insula of the left hemisphere.[6]

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[5] Jour. Amer. Med. Assoc., 1912, lix, 171.

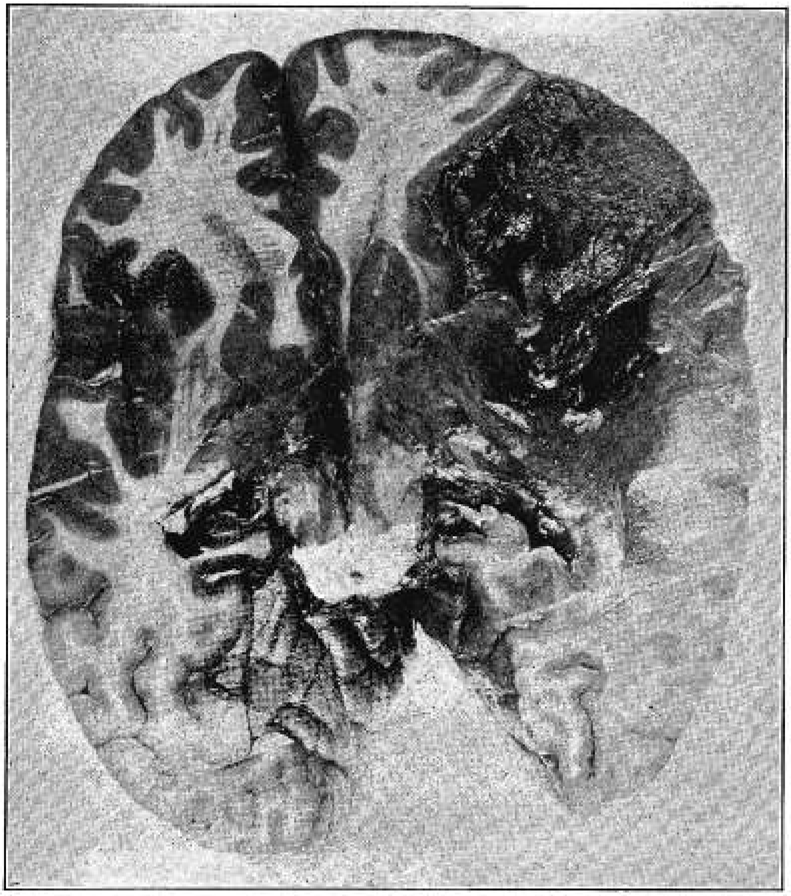

FIG. 3.—Tumor (round-cell sarcoma) wedged in between the left frontal and temporal lobes, penetrating the lateral ventricle.

While the frontal lobe of the left hemisphere suffered considerable compression, nevertheless the mental manifestations consisted only of mental dulness and indifference. We have seen above the tendency of some writers to lay especial stress on the frontal lobe and to find especially grave symptoms which could be considered as pathognomonic of an involvement of this particular portion of the brain. This case speaks emphatically against such a view.

[6] New York Med. Jour., January, 1913.